METHOD AND APPARATUS FOR HIGH FREQUENCY WIRELESS COMMUNICATION

BACKGROUND OF THE INVENTION

Field of the Invention:

The present invention relates generally to communication systems and methods, and more particularly to wireless transceivers for use in connection with high frequency, short wavelength systems.

State of the Art:

Communication systems which employ wireless transceivers are well known. However, as is the case with most electronic technologies today, there is an ever increasing demand to improve information transmission rates and range (that is, power output), while at the same time, reducing the influence of noise and improving the quality of transmission. In addition, there is always increasing demand to broaden the applicability of wireless communications to technologies still dependent on wired or fiber linked communication, such as mainframe-to-mainframe communications where high data rate and high power requirements have precluded the use of conventional wireless communications. To satisfy these competing concerns, a compromise is often reached whereby some sacrifice in transmission rate is accepted to enhance the integrity of the data transmitted. In addition, some sacrifice in transmission range is accepted to reduce the transceiver's circuit complexity and cost.

Accordingly, it would be desirable to provide systems and methods for communication which use a wireless transceiver, wherein the necessity to balance the foregoing system characteristics is avoided and wherein applicability is not limited by the data rate and/or power output requirements of the transceiver. More particularly, it would be desirable to provide a full duplex, wireless transceiver capable of providing high transmission rates (having, for example, transmit operating frequencies in an 18-40 gigahertz (GHz) spectrum range or wider and actual transmission rates on the order of 100 to 125 megabits per second (125 Mb/s), or higher), with high transmission power, high signal-to-noise ratios and reduced circuit complexity.

SUMMARY OF THE INVENTION

The present invention is directed to providing a full duplex communication system capable of providing actual wireless transmission rates on the order of 125 Mb/s, or higher, with relatively high transmission power on the order of 0.5 to 2 watts (W) or higher, with a high signal-to-noise(S/N) ratio, a bit error rate on the order of 10^{-12} or lower, 99.99% availability, and with relatively simple circuit designs. Exemplary embodiments can provide these features using a single compact and efficient, low distortion transceiver design based on high power (e.g., 0.5 W) monolithic millimeter wave integrated circuits (MMICs), having a compression point which accommodates high speed modems such as OC-3 and 100 Mb/s Fast Ethernet modems used in broadband networking technologies like SONET/SDH (e.g., SONET ring architectures having self-healing ring capability). By applying high power MMIC technology of conventional radar systems to wireless duplex communications, significant advantages can be realized. Exemplary embodiments have transmit operating frequencies in a fixed wireless spectrum of 18-40 GHz or wider, and produce a power output on the order of 0.5 W to 2 W or more, with a relatively simple circuit design. Exemplary embodiments also use a dual polarization antenna feature to provide transmission/reception isolation. The antenna can be configured as an integrated flat plane antenna. In addition, exemplary embodiments achieve a design compactness with an exciter design that can be employed for both the transmitter and receiver. As such, the present invention has wide application including, for example, point-to-point wireless communications between computers, such as between personal computers, between computer networks and between mainframe computers, over broadband networks with high reliability. Exemplary embodiments are further directed to a transceiver wherein components used for at least one of modulation and demodulation of information are mounted directly to a housing, materials used for the various components and for the housing having coefficients of thermal expansion which are matched.

Generally speaking, exemplary embodiments of the present invention are directed to an apparatus for wireless communication of information comprising:

at least one of a signal modulator for producing information signals and a signal demodulator for receiving said information signals, configured using at least one monolithic millimeter wave integrated circuit; and an antenna for at least one of wireless transmission and wireless reception of said information signals.

In an alternate embodiments, an apparatus and associated method are provided for wireless communication (transmission or reception) of information, comprising: means for performing at least one of modulating and demodulating information signals; and means for information transmission/reception, said information transmission/reception means providing for information transmission using a first polarization and for information reception using a second polarization to thereby isolate information transmission from information reception.

In yet alternate embodiments of the present invention, a transceiver is provided which comprises: at least one of a modulator for modulating information and a demodulator for demodulating information; and a housing within which said at least one of modulator and demodulator is mounted, components used for at least one of modulation and demodulation of said information being mounted directly to said housing.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the present invention will become apparent to those skilled in the art upon reading the following detailed description of preferred embodiments, in conjunction with the accompanying drawings, wherein like reference numerals have been used to designate like elements, and wherein:

Figure 1 shows an exemplary embodiment of a transmitter block diagram for use in a transceiver;

Figure 2 shows an exemplary block diagram of a transmitter voltage regulator which can be used in conjunction with the Figure 1 transmitter;

Figure 3 shows an exemplary embodiment of a receiver block diagram which can be used in conjunction with a transceiver of the present invention;

Figure 4 shows an exemplary embodiment of a receiver voltage regulator which can be used in conjunction with the Figure 3 receiver;